REMARKS

Claims 15-24, 26, 27 and 29-32 are pending in the application. Claims 1-14, 25 and 28 were previously canceled. Favorable reconsideration of the application, as amended, is respectfully requested.

I. REJECTION OF CLAIMS 15, 16, 19, 20, 25, 26, 31 AND 32 UNDER 35 U.S.C. § 103(a)

Claims 15, 16, 19, 20, 25, 26, 31 and 32 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Arends et al. (U.S. Patent No. 4,377,377) in view of Brill et al. (U.S. Patent No. 4,450,201). (Applicants wish to point out that claim 25 was previously canceled.) The Examiner acknowledges that Arends et al. fails to disclose the use of a heat transmission barrier. However, it is the Examiner's position that it would have been obvious to use a heat transmission barrier in the thermoforming machine of Arends et al. based on the teaching of Brill et al. of a selective radiation transmitting and radiation blocking foil having a multilayer heat barrier. The Examiner further contends that it would have been obvious to modify the operating temperature of the thermoforming machine of Arends et al. to form a pattern in the workpiece, the workpiece being a thermoplastic polymeric sheet.

Applicants respectfully traverse the rejection for at least the following reasons. Arends et al. is directed to a thermoforming machine wherein opposed platens operate together to mold a sheet material into the shape formed by the mating platens. The entire sheet is molded into a specific shape. Arends et al. does not teach applying a first pattern to a first surface and a second pattern to a second surface. Arends et al. certainly does not teach applying a pattern of micro- and nanostructures onto the first and second surfaces of an object.

Brill et al. is directed to a heat barrier having high heat reflective properties while having good transmissivity to light within the visible spectral range. The heat barrier is applied to a substrate such as glass or a polyester film. The barrier allows a portion of the sunlight that causes heat to penetrate from the outside into the interior of a space through the barrier arranged, for example, on a window, in order to

heat the interior of the space. The heat barrier prevents, however, re-radiation of the heat from the interior towards the outside. Contrary to the Examiner's assertion, one skilled in the art would not have been motivated to include the light transmissive heat barrier of Brill et al. into the platen of Arends et al.

Moreover, the half-bearing assemblies 28 and 30 of the thermoforming machine of Arends et al. would not be capable of positioning the first and second stamp with such precision as to facilitate transfer of micro- or nano-structured patterns from the first and second stamps toward the object. The recitation in the present claims of "micro- and nanostructures" is not merely a reduction in size. For the thermoforming machine of Arends et al. to be capable of transferring micro- or nanostructures onto the surface of an object, the thermoforming machine would not merely have to be scaled down, the thermoforming machine would have to perform in a *significantly different manner*. The transfer of micro- or nanostructures not only leads to an increase in resolution, but also introduces a host of problems to be dealt with, including:

1) how to transfer structures of such size onto a stamp;
2) how to accurately transfer these patterns onto the object;
3) how to prevent distortion in size of these patterns during transfer from the stamp onto the object; and
4) how to avoid skewed micro- or nanostructures during imprint onto the object.

Furthermore, the foregoing problems would have to be addressed in a mass-production operation. Arends et al. is directed to molding objects on a macro scale and therefore does not address or even acknowledge the existence of these problems. The combined teachings of Arends et al. and Brill et al. fail to recognize that in forming micro- or nanostructures, the heat expansion coefficients between the contacting means and the pressing means greatly influences the transfer of the micro- or nanostructures. Because there is no recognition of the problem, there is certainly no solution to the problem provided by the combined teachings of Arends et al. and Brill et al.

One skilled in the art would have had no expectation of success that thermoforming machine of Arends et al. could be scaled down in order to precisely form micro- or nanostructured patterns on a first surface and a second surface of an object. Moreover, even if the thermoforming machine of Arends et al. were to be scaled down, it still would function in a significantly different manner than the device and method of the present invention.

The combined teachings of Arends et al. and Brill et al. fail to teach or suggest all of the features of the claimed device and method. Accordingly, prima facie obviousness has not been established and the rejection of claims 15, 16, 19, 20, 26, 31 and 32 under 35 U.S.C. §103(a) should be withdrawn.

II. REJECTION OF CLAIMS 31 AND 32 UNDER 35 U.S.C. § 103(a)

Claims 31 and 32 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lynch et al. (U.S. Patent Application Publication 2001/0029714) in view of Arends et al. (U.S. Patent No. 4,377,377) and Brill et al. (U.S. Patent No. 4,450,201). The Examiner contends that it would have been obvious to operate at a lower temperature motivated by the desire to use different material, and that a device able to heat to 450° could reasonably be adapted to operate at a lower temperature.

Applicants respectfully traverse the rejection for at least the following reasons. As discussed above, one skilled in the art would have had no expectation of success that thermoforming machine of Arends et al. could be scaled down in order to precisely form micro- or nanostructured patterns on a first surface and a second surface of an object. Furthermore, even if one skilled in the art were somehow motivated to combine the teachings of Arends et al. with those of Brill et al., the resulting combination fails to teach or suggest all of the features of the device of claim 19. Lynch et al. is directed to a reverse molded fiberboard panel for use as wainscot. Lynch et al. fails to cure the deficiencies of the combined teachings of Arends et al. and Brill et al. Therefore, the rejection of claims 31 and 32 under 35 U.S.C. §103(a) should be withdrawn.

III. REJECTION OF CLAIMS 15-21 AND 24-30 UNDER 35 U.S.C. § 103(a)

Claims 15-21 and 24-30 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lynch et al. (U.S. Patent Application Publication 2001/0029714) in view of Arends et al. (U.S. Patent No. 4,377,377) and Brill et al. (U.S. Patent No. 4,450,201). (Applicants wish to point out that claims 25 and 28 were previously canceled.) The Examiner contends that Lynch et al. teaches a device for creating a two-sided pattern to a two-sided object by way of using two stamps. The Examiner acknowledges that Lynch et al. fails to teach a system for securing and cyclically moving the pair of opposing molding patterns to a pressing position and an open position, and further, fails to teach an alignment means. It is the Examiner's position, however, that Arends et al. addresses these issues in Figure 2, and that it would have been obvious to incorporate the thermoforming system of Arends et al. to a stamping apparatus as suggested by Lynch et al. in order to allow for flexibility in a molding operation without imposing any undue loading on any components of the drive system and to provide accurately and precisely positioned opposing imprint to the fiberboard. Although Lynch et al. fails to disclose forming micro- or nanostructures on the fiberboard, the Examiner contends that it would have been obvious to form patterns having dimensions in the range of 0.1 to 0.5 mm based on the disclosure in Lynch et al. of "sharp, crisp design detail".

Applicants respectfully traverse the rejection for at least the following reasons. As discussed above, one skilled in the art would have had no expectation of success that thermoforming machine of Arends et al. could be scaled down in order to precisely form micro- or nanostructured patterns on a first surface and a second surface of an object. Lynch et al. is directed to a reverse molded fiberboard panel for use as wainscot. There is no disclosure whatsoever in Lynch et al. of a device capable of precisely forming micro- or nanostructured patterns on a first surface and a second surface of an object. Even if one skilled in the art were motivated to modify the thermoforming machine of Arends et al. to include the opposing molding patterns of Lynch et al., and then further to include the light transmissive heat barrier of Brill et al. into the platen of Arends et al. or Lynch et al., the resulting device and method

would not be the device and method of claims 15-21, 24, 26-27 and 29-30. Therefore, prima facie obviousness has not been established and the rejection of claims 15-21, 24, 26-27 and 29-30 under 35 U.S.C. §103(a) should be withdrawn.

IV. REJECTION OF CLAIMS 22 AND 23 UNDER 35 U.S.C. § 103(a)

Claims 22 and 23 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lynch et al. (U.S. Patent Application Publication 2001/0029714), Arends et al. (U.S. Patent No. 4,377,377) and Brill et al. (U.S. Patent No. 4,450,201), and further in view of Shimada (U.S. Patent No. 6,325,609). The Examiner acknowledges that the combination of Lynch et al., Arends et al. and Brill et al. fail to teach a pressure sensor for monitoring the pressure of the process. Nevertheless, the Examiner contends that it would have been obvious to use a pressure sensor including a control unit in order to detect or control the pressure of the process so that a desired pressure can accurately and precisely be exerted on the workpiece during pressing operation, based on the disclosure of Shimada of a compression molding machine for powder material.

Applicants respectfully traverse the rejection for at least the following reasons. As discussed above, Even if one skilled in the art were motivated to modify the thermoforming machine of Arends et al. to include the opposing molding patterns of Lynch et al., and then further to include the light transmissive heat barrier of Brill et al. into the platen of Arends et al. or Lynch et al., the resulting device and method would not be the device claim, from which claims 22 and 23 depend.

Shimada is directed to a compression molding machine for powder material. The machine of Shimada compresses powder material filled between compressing components so as to mold the powder material into a product by making the compression components approach each other to a predetermined distance. Even if one skilled in the art were to dissect the pressure sensor of Shimada and transplant it into the fiberboard mold of Lynch et al. as modified by Arends et al. and Brill et al., the result would not be the device of claims 22 and 23. Therefore, prima facie

obviousness has not been established and the rejection of claims 22 and 23 under 35 U.S.C. §103(a) should be withdrawn.

V. CONCLUSION

Accordingly, claims 15-24, 26, 27 and 29-32 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should a petition for an extension of time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, LLP

/Heidi A. Boehlefeld/
Heidi A. Boehlefeld, Reg. No. 34,296

DATE: December 30, 2009

The Keith Building
1621 Euclid Avenue
Nineteenth Floor
Cleveland, Ohio 44115
(216) 621-1113